REMARKS

Claim 11 has been canceled. Claims 1, 4, 12-17 remain pending. Independent method claims 4 and 17 have been amended. No new matter was added. Arguments for the patentability of the method and device claims over the prior art of record are presented. Accordingly, Applicants respectfully submit that the present application is in condition for allowance.

I. Claim Rejections - 35 USC §103(a)

A. In the non-final Office Action dated June 17, 2010, claims 1, 4 and 12-17 are rejected under 35 USC §103(a) as being obvious over U.S. Patent No. 6,521,062 B1 issued to Bartholomeusz et al. in view of U.S. Patent No. 6,153,315 issued to Yamakoshi et al.

Method claims 4, 12 and 17

With respect to claims 4, 12 and 17 of the present application, which are directed to a method of processing a sputtering target, amendments have been made to independent claims 4 and 17 such that the subject matter of former claim 11 (now canceled) has been incorporated therein. In addition, in claim 4, the "finishing processing step" has been amended with "consisting of" terminology (closed-ended claim terminology). Accordingly, claim 4 requires a finishing processing step "consisting of polishing a thickness of 1μm to 50μm from said target surface with sandpaper or a grindstone having a rough abrasive grain size of #80 to #400". With respect to claim 17, the method has been limited to consist of the melting, casting rolling, subjecting, and finish processing steps.

Accordingly, Applicants respectfully submit that method claims 4, 12 and 17 are patentable and are not obvious over Bartholomeusz et al. in view of the Yamakoshi et al. patent. Applicants respectfully request reconsideration and removal of the rejection of the method claims.

Sputtering Target Claims 1 and 13-16

In the Office Action, it is readily admitted that Bartolomeusz et al. are "silent with respect to the presence of oxides, carbides, and carbonitrides, the matrix being highly ductile phase, the volume percentage of precipitates of 1% to 50%, the Vickers hardness of the matrix and other substances without ductility and the attendant hardness difference of the two". It is further admitted that "Bartholomeusz discloses machining work of cutting the sputtering target from rolled plate (Abstract, claims 12 and 13) which would be considered to create defects of the type barred by instant product claim 1." Thus, Bartolomeusz et al. fail to disclose almost all claim limitations of claims 1 and 13-16 of the present application.

Nonetheless, these claim limitations are dismissed as obvious for the following two reasons. First, it is concluded that the sputtering target of Bartholomeusz et al. is of a "substantially similar composition" and is "produced by a substantially similar process" and thus all the above limitations would be obvious. Second, Yamakoshi et al. is cited relative to the use of "precision machining" followed by "wet polishing" or "chemical polishing" and it is assumed that such processing would produce the required surface defects claim limitation. Applicants respectfully disagree and request reconsideration of this rejection.

The present invention is directed to a material in which intermetallic compounds, oxides, carbides, carbonitrides and other substances without ductility are dispersed in a highly ductile matrix phase. This material is processed by way of melting, casting and rolling. However, defects such as cracks may occur with a brittle dispersed phase as the point of origin during surface cutting using a cutting tool. Accordingly, the present inventors use a special surface processing method to the specifically defined material to provide a sputtering target with few surface defects.

Bartholomeusz et al. disclose a processing method for a brittle Co-Cr-Pt-B-Ta alloy in which plastic working (i.e., rolling) of the ingot is "impossible" since the content of Ta and B exceeds the solubility limit and the dispersed density of the intermetallic compound phase in the ingot exceeds a certain level (see column 3, lines 12-14, and column 3, line 59 to column 4, line 3). Also, see: the Abstract, lines 1-2; column 1, line 27; and column 3, lines 13-14 and lines 66-67, for a disclosure that the ingot material is "impossible" to roll-deform because it is too brittle.

The gist of the technology disclosed in Bartholomeusz et al. is that if the foregoing ingot is annealed in advance at 1500 to 2000°F and the annealed ingot is processed so that the thickness/width ratio becomes 0.5, an effect is yielded in that the ingot can be rolled (column 2, line 65, to column 3, line 11).

Applicants respectfully submit that although the target alloy of Bartholomeusz et al. may contain similar components, the properties of the alloy of Bartholomeusz et al. are different than that of the present invention, and thus, the compositions are not "substantially similar". The composition of the present invention is rollable without the need for any processing steps or thickness/width limitations. For example, see: page 7, lines 16-19; page 8, lines 2-6 and 17-21; page 10, lines 13-15; and page 10, line 28, to page 11, line 2, of the present application, as filed. All examples disclose rolling without any need of additional processing to make such material rollable. Accordingly, Applicants respectfully submit that it is not possible to conclude that the alloy composition of Bartholomeusz et al. and that of the present invention are "substantially similar" since the material of Bartholomeusz et al. is "impossible" to roll (without requiring additional thermal processing and thickness/width restrictions) whereas the alloy of the present invention is clearly rollable.

For this reason, Applicants respectfully submit that it is an error to conclude that the sputtering target of Bartholomeusz et al. is of a "substantially similar composition" and

inherently has "the presence of oxides, carbides, and carbonitrides, the matrix being highly ductile phase, the volume percentage of precipitates of 1% to 50%, the Vickers hardness of the matrix and other substances without ductility and the attendant hardness difference of the two".

Still further, Yamakoshi et al. fail to disclose the specific type of polishing required by the present invention to provide the surface defects limitation with respect to the specific target composition of the present invention. See Table 1 (on column 6), Table 4 (on columns 8 and 9), Table 7 (on column 11), and Table 14 (on column 14) of Yamakoshi et al. which disclose the type of polishing required by the Yamakoshi et al. patent. From these Tables, it is clear that the target materials are limited to pure Ti, Ta, Cu and Al which possess substantially different properties than that of the composition required by the present invention. These Tables disclose that "lathe machining", "diamond-finishing machining" (optional), and "wet polishing" or "chemical polishing" is applied to the pure Ti, Ta, Cu and Al targets. Here, "wet polishing" and "chemical polishing" are clearly different from polishing with sandpaper or a grindstone having a rough abrasive grain size of #80 to #400 as required by the present invention.

Applicants respectfully submit that "wet polishing" or "chemical polishing" would not provide the surface defects limitation required by the claims of the present invention when the "wet polishing" or "chemical polishing" is applied to such a non-uniform material as that required by the present invention.

Accordingly, Applicants respectfully submit that Bartholomeusz et al. fail to disclose the target material required by the claims of the present application and that even if the teachings of Yamakoshi et al. were applied to a target material required by the claims of the present application, they would not result in providing the surface defects claim limitation. Applicants respectfully request reconsideration and removal of the above rejection of claims 1 and 13-16.

B. *In the non-final Office Action dated June 17, 2010, claim 11 is rejected under 35 USC §103(a) as being obvious over U.S. Patent No. 6,521,062 B1 issued to Bartholomeusz et al. in view of U.S. Patent No. 6,153,315 issued to Yamakoshi et al. and further in view of U.S. Patent No. 6,024,852 issued to Tamura et al.*

The limitation stated by claim 11 is now recited in independent claims 4 and 17, as amended, of the present application. Accordingly, this rejection is addressed with respect to claims 4 and 17, as amended.

Tamura et al. describe the step of performing mirror-like finishing to a sputtering surface made of Ti to obtain an average roughness of 0.01μm or less. More specifically, this mirror finishing is provided by performing lapping by sequentially using an alumina slurry of #300, #600 and #1200, thereafter performing polishing by sequentially using paste containing diamonds having an average grain size of 15μm, 6μm and 2μm, and finally performing polishing by using a slurry containing silica having an average grain size 1μm or less as the final processing. This definition of "mirror" treatment or finishing is recited on column 3, lines 1-13, of Tamura et al., as follows:

> "Here, the mirror treatment is carried out by lapping by successively using a slurry containing alumina of #300, a slurry containing alumina of #600, and a slurry containing alumina of #1200. After this, polishing of the so-called wet method is carried out by successively using a paste containing diamond of an average grain size of 15μm, a paste containing diamond of an average grain size of 6μm, and a paste containing diamond of an average grain size of 2μm. It should be noted that stress caused in the sputter target 1 by the aforementioned lapping is eliminated by this polishing of the wet method. After this, as a finishing process, a slurry containing silica of an average grain size of 1μm or below is used for polishing."

Independent claim 4 of the present application has been amended to require "said finishing processing step consisting of polishing a thickness of 1μm to 50μm from said target surface with sandpaper or a grindstone having a rough abrasive grain size of #80 to #400". This step is the final processing step and this step is limited to consisting of polishing with sandpaper

or grindstone have the rough abrasive grain size of #80 to #400. The "lapping ... using a slurry containing alumina of #300" of Tamura et al. is not final processing and several additional steps are required to complete the "mirror treatment" disclosed by the Tamura et al. patent.

The present inventors have found that the "sandpaper or a grindstone having a rough abrasive grain size of #80 to #400" of the present invention efficiently eliminates defects in the form of cracks and indentations caused by fallouts that occur at locations where intermetallic compounds, oxides, carbides, carbonitrides and other substances without ductility exist as a point of origin within a highly ductile matrix phase. Tamura et al. provide no disclosure that would make the claimed invention obvious to one of ordinary skill in the art and how such defects in such a material can be efficiently eliminated. In addition, Tamura et al. provide no motivation for using the required sandpaper or a grindstone as required by claim 4.

Independent method claim 17 includes similar limitations. Claim 17 also limits the method to the steps recited.

Accordingly, Applicants respectfully submit that method claims 4, 12 and 17 are patentable over the cited combination of references and are not obvious to one of ordinary skill in the art based on the combination. Applicants respectfully request reconsideration and removal of the rejection.

II. Conclusion

In view of the above amendments and remarks, Applicants respectfully submit that the claim rejections have been overcome and that the present application is in condition for allowance. Thus, a favorable action on the merits is therefore requested.

Please charge any deficiency or credit any overpayment for entering this Amendment to our deposit account no. 08-3040.

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